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SECTION OF ENTOMOLOGY,
DEPARTMENT OF ZOOLOGY,
ALIGARH MUSLIM UNIVERSITY,
ALIGARH, INDIA.
August 13, 1985.

R. K. AVASTHI¹
S. ADAM SHAFEE

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- ¹ Present Address: Department of Zoology, Vaish College, Rohtak, India.

27. STUDIES ON THE BIOLOGY OF *PARNARA NASO* FABR. (LEPIDOPTERA: HESPERIIDAE)

The rice skipper feeds on the rice leaves and occurs throughout the rice growing tract. Rao *et al.* (1970) recorded it in nurseries and planted crops causing varying amounts of damage. *Baoris guttatus* Bada (*Parnara naso bada* M.) was recorded by Kulshreshtha *et al.* (1973) as causing damage to growing rice. Though a large number of references on the occurrence and biology of *Parnara* sp. on rice are available, information on the habits and

biology of *P. naso* is scanty. Hence, a detailed study of the biology, larval habits and the common larval parasites was undertaken.

MATERIALS AND METHODS

Females of *P. naso* were collected from rice fields and released in glass chimneys on potted rice plants for egg laying. After hatching of the eggs the larvae were transferred to cut rice

leaves in glass vials (15×15 cm.). Mature larvae were transferred to potted rice plants for pupation. The pupae were kept in glass jars for emergence of adults. Potted rice plants containing larvae and pupae of *P. naso* were placed in rice field for three days to trap the parasites. Later these were clipped and placed in glass vials for emergence of parasites.

RESULTS AND DISCUSSION

Egg: Eggs were laid irregularly and singly both on leaf surfaces and stems of rice plants. Ventral side of the leaf was preferred to dorsal side for egg laying. Eggs were round and bluish ash coloured with brownish specs which were absent in infertile eggs. Virgin females also laid eggs but infertile. Diameter of the egg measured 0.86 mm. Incubation period was 4.5 days. On the third day after egg laying the head of the larva appeared as a brownish spot on the top of the egg. Hatching took place during early morning hours. Just after hatching the larvae moved a little away from the egg shell and then turned back again and started feeding on the empty egg shell and later moved downwards along the leaves and entered the folds of tender leaves.

Larva: Five larval instars were observed in the laboratory. Duration and measurements of

the different larval instars and pupa are presented in Table 1. Anterior one third region of the freshly hatched larva is light greenish blue and rest of the body dirty white. Head dirty brown. Just behind the head on the dorsal side a narrow dark brown line occurs on the collar. This line was not continuous on the ventral side. Eight to ten hours after hatching larvae fed on leaf blades from inside small leaf folds with lateral notches. Second instar larva was similar to first instar larva except in size and the last abdominal segment being more elongated and projecting. Colour of the head was similar to that of first instar but the median suture was more prominent. The mode of feeding was similar to the first instar larva but the lateral notch on the leaf blade deepened upto the mid rib. Head of the third instar larva is light black and length of the larva increases considerably. In the fourth instar larva, head is brown with whitish markings in a specific pattern. In the fifth instar whitish markings on the head became more prominent. Head pinkish brown. Dorsal side of the head yellowish green. Deep green mid dorsal line from anterior to posterior end of the body prominent. On the third day after moulting, corresponding to the last three pairs of legs and one segment behind that, four oval whitish patches were seen laterally on both sides of the body of the larva. Day by day these patches became more pronounced. Dirty white powder came out of these patches when touched by hand or brush.

Moulting: Six to eight hours before moulting of any instar larva, thorax region appeared swollen and whitish. Collar line became shortened and thickened. Head of the freshly moulted larva was white and no collar line was observed, however, within an hour of moulting head became dark and the collar line reappeared.

Pupa: Before pupation the larva became

TABLE I
MORPHOMETRIC STUDIES ON IMMATURE STAGES OF
Parnara naso FABR.

Stage of the insect	Length in mm	Width in mm	Duration in days
Egg (diameter)	—	0.86	4.50
First instar	2.50	0.52	3.63
Second instar	3.38	0.72	3.12
Third instar	6.30	1.13	3.39
Fourth instar	10.00	1.62	4.06
Fifth instar	19.62	2.46	7.06
Pupa	19.00	—	5.00

soft to touch and looked yellowish green. White incrustations at the posterior lateral side of the abdomen bulged outside. Larvae pupated inside a cocoon constructed by joining two to three leaves together or in between rice stems. Inside the cocoon the pupa was covered by white dust possibly produced by the four pairs of posterior encrustations. Freshly formed pupae were yellowish green and changed to brownish colour afterwards.

Parasites: The following parasites were reared from the field collected larvae of *P. naso*, *Apanteles* sp. incogn., *Apanteles* sp., *Charops bicolor* and *Argarophylax* sp. The following

pupal parasites were reared from pupae of *P. naso*, *Thecocarcelia oculata* Baranov, *Brachymeria* sp. nr. *lasus* Walk., *Ischnojoppa luteator* Fabr. and *Xanthopimpla* sp.

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CENTRAL RICE RESEARCH INSTITUTE,
CUTTACK-753 006, ORISSA, INDIA.
August 13, 1985.

V. N. RAO
K. S. BEHERA

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28. DISTRIBUTION OF *DROSOPHILA* SPECIES INHABITING THE TROPICAL RAIN FORESTS OF SAMPAJE GHATS (COORG DISTRICT), KARNATAKA, SOUTH INDIA

INTRODUCTION

Judging from the reports on the occurrence and the pattern of distribution on the members of the genus *Drosophila* from other parts of the world it appears that only little has been done in the Indian sub-continent. In spite of the considerable progress made during the past few years (Parshad and Paika 1964, Parshad and Duggal 1965, 1966; Rehman and Singh 1969, Gupta and Ray Chaudhuri 1970, Singh 1970, Jha, Mishra and Singh 1971, Reddy and Krishnamurthy 1971, 1974, 1977; Vaidya and Godbole 1971, 1972, 1973, 1976;

Ranganath and Krishnamurthy 1972, Gupta 1973, 1974; Gupta and Singh 1977, Prakash and Reddy 1978) information pertaining to the occurrence and pattern of distribution of the members of the genus *Drosophila* in different eco-geographical regions of the country is not clearly known. For instance many parts of the tropical rain forests of western ghats still await exploration. In view of this, Sampaje ghats near Madikeri, Coorg district (a part of western ghats) has been chosen to get an insight into the *Drosophila* species inhabiting this region. The complex natural habitats of the tropical rain forests of this area with